# Safety Data Sheet

# 2-Naphthylamine

Division of Safety
National Institutes
of Health

WARNING!

THIS COMPOUND IS ABSORBED THROUGH THE SKIN AND THE RESPIRATORY AND INTESTINAL TRACTS. IT IS TOXIC, CARCINOGENIC, AND MUTAGENIC. AVOID FORMATION AND BREATHING OF AEROSOLS.

LABORATORY OPERATIONS SHOULD BE CONDUCTED IN A FUME HOOD, GLOVE BOX, OR VENTILATED CABINET.

AVOID SKIN CONTACT: IF EXPOSED, WASH WITH SOAP AND WATER.

FOR EYE EXPOSURE, IRRIGATE IMMEDIATELY WITH LARGE AMOUNTS OF WATER. FOR INGESTION, DRINK WATER, INDUCE VOMITING, OR REFER FOR GASTRIC LAVAGE. FOR INHALATION, REMOVE VICTIM PROMPTLY TO CLEAN AIR. ADMINISTER RESCUE BREATHING IF NECESSARY. REFER TO PHYSICIAN.

IN CASE OF LABORATORY SPILL, WEAR PROTECTIVE CLOTHING DURING CLEANUP. AVOID SKIN CONTACT OR BREATHING OF AEROSOLS. USE ETHANOL TO DISSOLVE COMPOUND. WASH DOWN AREA WITH SOAP AND WATER. DISPOSE OF WASTE SOLUTIONS AND MATERIALS APPROPRIATELY.

## A. Background

2-Naphthylamine (2-NA) is moderately toxic to rats and produces tumors in animals and humans, with the bladder as primary target organ. It is mutagenic in the Ames test. 2-NA is used commercially as an intermediate in dye manufacture and in the laboratory as a model compound in carcinogenesis studies.

## B. Chemical and Physical Data

1. Chemical Abstract No.: 91-59-8

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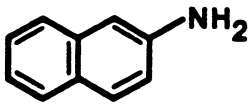
2. Synonyms:

| | |
|---|---|
| BNA | 2-Naphthalamine |
| NA | 2-Naphthylamine |
| 2-NA | 2-Aminonaphthalene |
| C.I. 37270 | 2-Naphthaleneamine |
| USAF CB-22 | Fast Scarlet Base B |

2-Naphthalenamine (9CI)

3. Molecular formula: $C_{10}H_9N$

structure:




weight: 143.2

4. Density: 1.061 g/cm$^3$ at 98°C relative to water at 4°C.

5. Absorption spectroscopy: IR and UV spectra are described by Grasselli and Ritchey (1975).

6. Volatility: Vapor pressure is 1 mm Hg at 108°C. (For volatilities at higher temperatures, see Weast, 1979, p. D-212). Steam volatile.

7. Solubility: Soluble in hot water, ethanol, ether, benzene, and other organic solvents.

8. Description, appearance: White to reddish leaflet crystals that darken in air to reddish-purple color. No odor.

9. Boiling point: 306.1°C (158°C at 10 mm Hg).

   Melting point: 111-113°C.

10. Stability: Oxidizes on exposure to air.

11. Chemical reactivity: 2-NA exhibits the usual reactivity of primary aromatic amines (salt formation, acylation, alkylation, isocyanide formation, diazotization, oxidation by neutra and basic permanganate) and of aromatic compounds in general (ring substitution).

12. Flash point: No data.

13. Autoignition temperature: No data.

14. Explosive limits in air: No data.

## Fire, Explosion, and Reactivity Hazard Data

1. Fire-fighting personnel should wear air-supplied respirators and full-face masks.

2. No conditions contributing to instability, other than oxidation in the presence of air and light and of oxidizing materials, are known to exist. Aromatic amines are slightly flammable.

3. No incompatibilities are known.

4. Aromatic amines may form toxic fumes when heated to decomposition.

5. 2-NA does not require nonspark equipment. When handled in flammable solvents, the precautions required for such solvents apply. Open flames may cause flashing.

## Operational Procedures

The NIH Guidelines for the Laboratory Use of Chemical Carcinogens describe operational practices to be followed when potentially carcinogenic chemicals are used in NIH laboratories. The Guidelines should be consulted to identify the proper use conditions required and specific controls to be implemented during normal and complex operations or manipulations involving 2-NA.

1. Chemical inactivation: No validated method reported.

2. Decontamination: Turn off equipment that could be affected by 2-NA or the materials used for cleanup. Call the NIH Fire Department (dial 116) for assistance. Wipe surfaces with ethanol, then wash with copious quantities of water. Glassware should be rinsed (in a hood) with ethanol, followed by soap and water. Animal cages should be washed with water.

3. Disposal: No waste streams containing 2-NA shall be disposed of in sinks or general refuse. Surplus 2-NA or chemical waste streams contaminated with 2-NA shall be handled as hazardous chemical waste and disposed of in accordance with the NIH chemical waste disposal system. Nonchemical waste (e.g., animal carcasses and bedding) containing 2-NA shall be handled and packaged for incineration in accordance with the NIH medical-pathological waste disposal system. Potentially infectious waste (e.g., tissue cultures) containing 2-NA shall be packaged for incineration, as above. Burnable waste (e.g., absorbent bench top liners) minimally contaminated with 2-NA shall be handled as potentially infectious waste and packaged for incineration, as above. Absorbent materials (e.g., associated with spill cleanup) grossly contaminated shall be

handled in accordance with the chemical waste disposal system. Radioactive waste containing 2-NA shall be handled in accordance with the NIH radioactive waste disposal system.

4. Storage: Store in glass ampoules or in amber screw-capped bottles with Teflon cap liners, preferably under refrigeration. Avoid unnecessary exposure to light.

## Monitoring and Measurement Procedures Including Direct Field Measurements and Sampling for Subsequent Laboratory Analysis

1. Sampling: For airborne particles smaller than 0.3 μm, impingers and bubblers filled with dilute hydrochloric acid are used for benzidine and its congeners, and this procedure is probably satisfactory for 2-NA also. For larger particles, a high-volume air sampler with a fiberglass filter trap can be used. For surface sampling, a cotton applicator moistened with an aqueous buffer is employed, and identification is made by spectrophotofluorimetry. Techniques for sampling metal, painted, and concrete surfaces have been reported (Weeks et al., 1976).

2. Separation and analysis: A sensitive GC procedure is based on the formation of the pentafluoropropionamide of 2-NA (Masuda and Hoffman, 1969a, 1969b). A variety of colorimetric procedures have been reported but are subject to various interferences. The most reliable ones combine paper chromatographic separation with spectrophotometric measurement (Sawicki et al., 1959).

## Biological Effects (Animal and Human)

1. Absorption: 2-NA is absorbed into the animal, and presumably the human, body by inhalation, by ingestion, and through the intact skin.

2. Distribution: No data.

3. Metabolism and excretion: Metabolic products of 2-NA result from oxidation (hydroxylation) of the amino group (with further oxidation to the nitroso compound) and of the naphthalene structure, usually in positions 1, 5, and 6. These compounds, usually in the form of conjugates, are excreted in the urine (IARC, 1974).

4. Toxic effects: The reported oral LD50 of 2-NA in rats is 727 mg/kg The target organ for toxicity is the blood (methemoglobinemia).

5. Carcinogenic effects: The target organ in humans and in dogs, monkeys, hamsters (though not in mice and rats) is the bladder. In mice, hepatomas are found. In occupational exposures of workers engaged in the production of aniline dyes, a cause-effect relationship has been established between exposure to 2-NA and subsequent bladder cancer (IARC, 1974). It is generally believed that the primary carcinogen is not 2-NA itself but its metabolic product, N-hydroxy-2-NA (Radomski and Brill, 1971; Radomski et al.,

6. Mutagenic and teratogenic effects: 2-NA acts as a mutagen in the Ames test and against Neurospora and yeast in the presence of oxidizing systems. There are no data concerning its teratogenicity.

## Emergency Treatment

1. Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with soap and water. For eye exposure, irrigate immediately with copious quantities of running water for at least 15 minutes. Consider ophthalmological consultatio

2. Ingestion: Drink plenty of water. Induce vomiting or refer fo gastric lavage.

3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.

4. Refer to physician. Oxygen may be necessary during transport. Observe for methemoglobinemia.

## References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Sawicki, E., T.W. Stanley, and T.R. Hauser. 1959. Detection of primary aromatic amines. Chem Anal 48:30-33.

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